BIBLIOGRAPHICAL NOTICES.

ART. XVII.—*Fragments of Science and Art. An Address delivered before the Boylston Medical Society of Harvard University.* By HENRY JACOB BIGELOW, M. D., President of the Society. Published by the Society.

THE author opens his address by alluding to "the brief period that has elapsed since he had the honour to be an immediate member of the society," composed, we believe, of under-graduates of the Boston Medical School. Had he not thus prefaced his discourse, the reader would have supposed it to be the work of one whom long years of labour and study had carried far away from the starting point in his professional career. In maturity of thought and correctness of style it is remarkable even when compared with the best essays relating to medical science and education. Its doctrines may or may not be true, (and we shall endeavour to show that some of them are open to objection,) but the skill and knowledge with which they are stated and defended, must command respect; and the ardent love of medical truth which breathes throughout the whole address must win for its author the sympathy of every professional brother, who regards medicine as something more than a trade,—who venerates it as a high and holy philosophy.

The principal object our author has in view is to show that while medicine is an inductive science, and while the numerical method is the most certain means of discovering inductive truth, there is yet a kind of hypothesis which is not only useful but necessary in order to arrive at general laws in the several departments of medicine. Upon this, the first and chief part of his subject, we shall offer some remarks. The address commences with a sketch of the inductive method of philosophizing, and assumes as an acknowledged principle that "the truth lies in facts, and that we have only to collect facts to discover it;" and, further, that written or recorded facts are much more valuable for the purpose in view than those which are only remembered. This Bacon established in regard to science generally, and Louis in regard to medical science; the former, by precept, however; the latter by practice. But admitting this general principle, "the student has yet a vague suspicion that the observer with his note-book is a dull man; that the process of induction does not require ability; that statistic results apart from observation are the work of laborious and slow minds,—of industry which plods, of intellect which never sparkles." But "a great discoverer is commonly a great genius," says our author, whence it follows, that if discoveries are to be made by observation and statistics, the discoverer who employs these mechanical aids cannot be a dull man. But observation and statistics, our author contends, are not always directly necessary for the discovery of medical laws; he affirms, that these may be deduced from propositions previously established in mechanics and chemistry; that some laws of physiology may be deduced from anatomy, and some of pathology from physiology. This doctrine is at variance with that of Dr. Bartlett, who, in his admirable essay on the Philosophy of Medical Science, establishes the principle that no new facts or relations can be deduced from ascertained facts and relations of a different kind; that physiology, for example, does not flow from anatomy, nor therapeutics from pathology, &c. We cannot think that Dr. Bigelow has been successful in maintaining a contrary doctrine. "The valves of the veins and the structure of the joints point directly to their uses," says Dr. Bigelow. It would be more correct to say that the uses of these parts are *explained* by their structure; for it was necessary for the discoverer of the former to be acquainted with the use as well as the structure of the artificial mechanical contrivances which the veins and the joints respectively resemble. A man who had seen many hinges but never one in motion, could hardly guess that a joint was made to execute the movement which really belongs to it. Besides, the uses of the joints, and the circulation of the blood, at least of the venous blood, were known before the anatomy of the parts in question. Whence it is incorrect to say that the structure of these latter *points* to their function. Again, Dr. Bigelow remarks, "the optician tells you that the crystalline lens throws an inverted image on the retina; a medical tyro will infer that opacity of the lens will obliterate this image," and we reply that, strictly speaking, the optician will be wrong, and the tyro the dupe of an hypothesis; for there is no image formed on the retina of a sound eye, nor as long as the choroid coat is perfect, and a black surface absorbs light. But this by the way. In being told that opacity of the crystalline lens induces blindness we do not learn a fact deduced from an optical law, for it is only one of the cases from which that law was inductively formed, since the eye would never have been suspected of illustrating optical science, if the several modes of vision and blindness had not been observed to coincide with opacity of the lens, and various obstacles to the entrance of light through the pupil. In the same way auscultation, which our author adduces as an example of the application of acoustics to pathology and semeiology, was not in any way deduced from acoustic principles; as a science it possesses a set of principles formed by induction from certain observed phenomena, and those principles being found identical with previously established acoustic laws, auscultatory phenomena are now directly referred to these laws. What says Laennec in the preface to the second edition of his treatise? "I have entirely altered the arrangement of the first edition. The greater number of the facts in it being entirely new, I felt obliged to follow in almost every part the analytical method; but now, on the contrary, the principal observations having been repeatedly verified, I adopt the synthetical method as the shortest." He discovered auscultatory laws by induction; he taught their application, of course, deductively. So it has ever been, and so must it of necessity ever be; no phenomena of one science can be referred to the laws of another before an induction in the case of each science has led to identical laws, in which event the two sciences are, up to a certain point, proved to be one and the same. As far as the phenomena of auscultation lead to acoustic laws, auscultation is a branch of acoustics; but only in so far. This Dr. Bigelow admits when he says that "the facts to which we are thus pointed are not decisive, because they are liable to be modified by another mechanism of which we know nothing. There are *vital forces* at work which counteract the most obvious tendencies of the material particles of the human fabric." And directly afterwards he seems to admit that deduction is of very limited application in medicine, in the following passage which shuts within itself the very kernel and essential principle of medical philosophy. "The chief employment of the medical philosopher is to establish the laws of phenomena; to ascertain the frequency with which certain facts occur with other facts; to point out the element most constant to a wide range of phenomena: the very ends which the inductive method of Bacon, and the numerical method of Louis, its medical application, teach us to attain with certainty. Medical diagnosis and medical prognosis obviously grow out of rigid induction."

Our author defines very clearly and accurately the value of the inductive method in therapeutics, as capable of determining not the exact power of a medicine in a given case, because no two cases of a disease are identical, but as establishing beyond all dispute, first, that a remedy has some value and next, very nearly what that value is. This being done, the appproximate value being obtained by a series of experiments on a large number of individuals, the more precise value in relation to a particular case must be found by a series of corrected experiments on the subject of that case. The advantage of the numerical method over unrecorded experience is not that it bestows more judgment, or supplies more agents, for treating a case of disease, but that it furnishes the best agents, and saves from the danger or disappointment of employing worthless ones.

As already intimated, Dr. Bigelow contends that there is a place for *hypothesis*, not only in medicine, but that "in some form, it is almost essential to the discovery of scientific truth." He admits that Bacon and Newton did not recognize this instrument, and that it is equally rejected by many philosophers of the present day. But they, he assures us, had, or have, in view unproved or false hypothesis only; for Newton defines hypothesis to be "whatever is not deduced from phenomena." Dr. Bigelow considers it to be "a form of induction," a proposition "drawn from few facts and applied to many." Now a *form* of induction, a proposition drawn from facts, be they few or many, is an induction, an imperfect one, if it include a portion only of the known facts relating to the subject examined, a perfect one if it include them all, but in either case it is an induction, not an hypothesis. Otherwise every inductive law of the physical sciences is an hypothesis, since no one of them is the generalization of all pertinent facts. In the sense of our author the proposition that quinine cures intermittent fever is an hypothesis, not an inductive conclusion. We therefore enter our protest against what we are compelled to regard as an unauthorized use of a word which physicians, above all other men, have abundant cause to look upon not only with distrust but with horror, as the representative of a power which, usurping the sceptre of science, has judicially slain its tens of thousands.

Dr. Bigelow endeavours to defend his proposed introduction of hypothesis into medical philosophy by showing that Newton himself in his theory of gravitation, Kepler in his determination of the orbit of Mars, and other astronomers in some of their most important discoveries, formed hypotheses which subsequent observation demonstrated to be true. This we readily admit, but the case of astronomy, and that of medicine are not parallel; in the one we have a few simple and well-determined elements which make the limits of possible error exceedingly narrow; but in the other, these limits are, to speak hyperbolically, illimitable, that is, they cannot be measured. Mr. Mill, in his profound treatise on inductive logic, lately republished in this country, sets this matter in a clear light. He shows that the hypothetical method of discovering truth may be legitimate, *provided* that it lead to true results; that the case be such that a false law cannot lead to a true result; and that no law except the very one assumed can lead deductively to the same conclusions which that leads to. It is needless to remark that these conditions have never been fulfilled by any medical hypothesis, properly so called, and that they have all been fulfilled by the hypotheses of Newton and Kepler, to which Dr. Bigelow refers. The theory of Jenner in regard to the protective virtue of vaccinia was not, though our author affirms it, an hypothesis. It was first propounded to him by others as a truth; he performed his experiments merely to give a wider base to his induction, and it led him to a certain law.

While we have thus animadverted upon what we conceive to be a misuse of the term hypothesis, and object to its employment in medical investigations, we heartily agree with Dr. Bigelow that some persons set a very undue value upon facts, "facts repeated, facts almost independent of their bearing or application;" seeming to consider them as the end and not the means; as the truth itself, and not the pathway leading to it. For such an error neither the founders of the numerical school nor its disciples are responsible; and, error though it be, we hold it of far less magnitude than a blind adherence to any medical hypothesis which has yet enslaved our profession. The mere collector or reader of cases is profitably employed, for he is studying nature; there is no danger but that he will generalize quite as soon as he ought; the student of hypothesis is wasting his time, and destroying his ability to benefit mankind, how much soever he may sharpen his own sight by gazing after things invisible to the natural eye. Give us the man who closely scans the objects that lie at his feet, and within reach of his hand, until he knows them and their relations thoroughly; rather than the aspiring philosopher who despises the objects with which he is in contact every moment, and who, lost in sublime meditations on things far above his sphere, walks innocently into the very first ditch of absurdity that lies across his path. In the other natural sciences hypotheses are comparatively harmless; they seldom lead either to the shortening of life, or the infliction of pain, (except on their inventors;) they are a sort of poetical recreation in which men of fervid genius may be permitted to indulge:—but who is there ready to anticipate complacently the consequences of inventing a medical hypothesis? has he counted the hecatombs which have been offered up at the shrines of Paracelsus, and Boerhaave, of Brown, and Hahnemann? Does he emulate their glory? No humane man would willingly incur such a responsibility. Nor does Dr. Bigelow, when, by the help of facts he would go beyond facts, that is, beyond truth, and when he describes hypothesis as a form of induction, seem to perceive whither his doctrine inevitably leads, or he would be the first to condemn it. But the moment that he admits the possibility of discovering physical truths by any other means than a rigid induction from physical phenomena, he throws open the door to that arch-enemy of medical science, Hypothesis. No matter by what name she is admitted, once she has gained entrance she will assert her sway, for in science now, as much as ever, men find it easier to believe than to examine. Let us bolt and bar the door against her. Far better were it to plod along the humble path of nature in company with Hippocrates, and Sydenham, and Louis, than to soar amongst the clouds of obscurity with Galen, and Sylvius, and Stahl. The interests of medicine will not be promoted by intellectual brilliancy that shines outward, but by mental power which appropriates the external, and digests and vitalizes it. The soil that sparkles most with diamonds is of all others the most barren of fruit. To return for a moment to the abuse of facts, (which, in common with Dr. Bigelow, we deplore,) we do not think that the faithful record of *all* the particulars of a case of disease unnecessary, even when collected with reference to a definite inquiry. He bids us "have a purpose in our investigations," to let them be for the purpose of verifying a law, of forming or of testing an hypothesis. We would rather advise the observer to record his observations without any ulterior view; to paint a portrait, to catch a Daguerreotype likeness of the case before him. This done, he possesses materials which may be used for various purposes. When he has many such cases let him search out the general truths contained in them by means of induction, not anticipating exactly whither the process will lead, only knowing that it will lead to truth. He needs no preconceived principles of arrangement for this purpose; as soon as the facts are numerous enough they will coalesce harmoniously by virtue of their inherent mutual attraction, as the particles of molten iron can crystallize only in one form.

There are many other portions of the first division of Dr. Bigelow's address which afford an occasion for approbatory remark, or the expression of respectful dissent, but the limits of this notice oblige us to leave them without comment, and to pass at once to his reflections upon medical art. Speaking of the unity of medicine and surgery in a scientific point of view, he thus vigorously reprobates those who would cut them asunder, and reduce surgery to a system of scientific butchery, or at best to the art of dissecting elegantly the living subject. "Do not identify surgery with the knife; with blood and dashing elegance. Distrust surgical intrepidity and boldness. If such epithets have any meaning, they are in bad taste, and tend to give the student a wrong impression of scientific excellence. War has ever respected science; why should the votaries of science themselves disturb its quiet paths by the harsh jargon of the battle field? What are brilliant achievements? The right subclavian artery and the innominata have been often tied with success, and the patient has always died. Boldness in battle implies voluntary exposure of one party, while it threatens danger to the other. In surgery the bold operator does not hazard his own person, but that of the patient is perhaps not less endangered. Science never hears of the ten or twenty quiet sufferers who fall victims to the publicity of an exceptional escape from surgical intrepidity."

Our author is of opinion that the old-fashioned "grave and professional demeanour" had better be laid aside, that we should "discourse on medical subjects honestly and hopefully," and, when the occasion demands, "avow the inadequacy of art" without fearing to derogate from its dignity; and this because people now-a-days will not "attribute to the physician superhuman sagacity." They will ask him for his premises, and think they have logical abilities enough to follow him to his conclusions. Therefore, he advises, "when you examine a medical case . . . . . spread out the facts: show which way they point. Do not say what your opinion is, but why it is so." "If you ever, in these days, acquire a reputation for infallibility, it will be after you have shown that you are infallible." To all of these sentiments we cannot subscribe, if they are meant to apply to the intercourse between physicians and patients. If men were mere reasoning machines the doctrine of our author might be upheld, but they are just as much swayed by moral motives now as in former times; indeed, the most striking difference we can discern between those times and ours, is that in the former intellect bowed to duty, while in the latter it has entered into an alliance offensive and defensive with selfishness. The intelligence of the people is just sufficient to delude them into a belief that they are not ignorant, and hence to make them believe anything that flatters their vanity.

Scientific men, indeed, are slow to be imposed on in matters with which they are conversant, and such men are modest in their knowledge. But we call to witness the whole medical profession, that intelligent men, men who must have reasons, men who will put their Doctor through his medical catechism before taking his prescriptions, that these are the very men who, having faith in nothing, are credulous of everything, and are by turns the disciples of every false prophet, and the advocates of every false doctrine begotten by visionary enthusiasts, or concocted by impudent impostors. Dr. Bigelow himself remarks, "that scientific excellence is not always the nucleus of extensive medical practice;" people do not trust the man who has most skill, but him who seems to have most; not the physician who has the best reasons for his practice, but the one who to them appears to have the best. The reason is plain: they are necessarily unable to decide upon the correctness of a medical argument; they consequently favour not that which is best, but that which pleases best. In other words, they are led by the man or the fashion, when they fancy they are guided by reason. There never was a period in which medicine was so worthy of veneration as the present, and we may safely assert that there never was one in which it was so much insulted. Physicians should look to it that they are clear of having aided in its degradation by endeavouring to let down their art to the level of the popular comprehension. They have given reasons to their patients when they should have given them conclusions only. They have thrown off the priest's garments and left the altars, to mingle undistinguished with the crowd; let them not complain when they see impostors standing in their wonted place. That power of controlling the mind and body of a patient through his faith in them which was once their high prerogative, they have now resigned; the base charlatan has appropriated it, and while they reason with their skeptical patient, the thief steals in and thrusts them from their post.

Dr. Bigelow concludes his address by exhorting his hearers to cultivate a pure morality; to avoid wasting their time in exposing the errors with which the vulgar love to be gulled; to abstain from taking out patents "for the common offices of Christian charity;" and lastly, "not to lose sight of science in their intercourse with art." We can say without fear of contradiction, that there are few amongst the published "Introductory Lectures, &c.," which we have read, that bear any comparison with this essay in vigour of thought, in familiarity with the principles of reasoning, or in soundness of precept. A. S.

Art. XVIII.—*Elements of Pathological Anatomy; illustrated by coloured engravings, and two hundred and fifty wood-cuts.* By Samuel Gross, M. D., Professor of Surgery in the Medical Institute of Louisville, &c. Second edition, thoroughly revised and greatly enlarged. Philadelphia and Louisville, Ed. Barrington and Geo. D. Haswell, 1845: royal 8vo., pp. 822.

We are happy to see a second edition of this work, the more especially as it has undergone a thorough revision since it was first issued from the press. This edition has been enlarged by several hundred pages of new matter, and by more than one hundred and fifty illustrations. Three chapters have been added to the first part, treating respectively of "Fistules," "Pneumatoses," and "Polypes," and a large amount of interesting and important matter inserted in the chapters on "the nervous system," "the respiratory apparatus," "the heart and its membranes," and in that on "the stomach and bowels." Indeed, the whole work gives evidence of the author's untiring industry and devotion; he seems to have neglected none of the accessible sources of information which have been opened within the last two years, and to have availed himself of them with a judgment that proves him to be a thorough master of his subject. The wood-cuts which illustrate his work, though not in the best style of this valuable art, convey, for the most part, a very good idea of the objects designed to be represented; and if the coloured